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NATIONAL DAM SAFETY PROGRAM. LAKE THERESE DAM (NJ-00349). RARIT--ETC(U)
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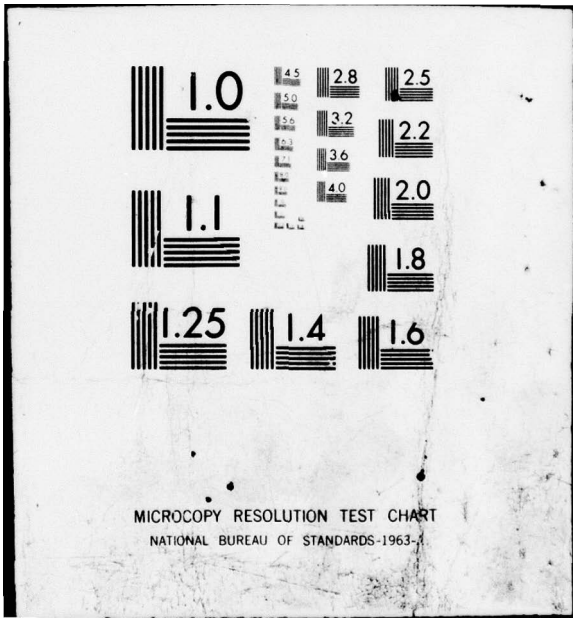
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Lake Therese Dam (NJ-00349). Raritan River Basin, McVickers Brook, Morris County, New Jersey. Phase 1 Inspection Report.

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DACW61-79-C-0011

(10) Richard McDermott
John E. Gribbin

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Lake Therese Dam, N.J.
Visual Inspection
Spillways
Structural Analysis
National Dam Inspection Act Report
Dams

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE - 2 D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO

NAPEN-D

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, NJ 08621

25 SEP 1979

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Lake Therese Dam in Morris County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, Lake Therese Dam, initially listed as a high hazard potential structure, but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in good overall condition and the spillway is adequate. To insure adequacy of the structure, the following remedial actions should be initiated within six months from the date of approval of this report:

a. The 12-inch and 24-inch outlet pipes should be restored to operable condition to provide drawdown capability for the reservoir. Also, an upstream valve should be installed on the 24-inch pipe to prevent full reservoir pressure in the pipe through the embankment.

b. Trees on the embankment should be cut off at the ground surface with minimal disturbance of the existing ground.

c. The south radial gate should be repaired to eliminate leakage.

d. The owner should initiate a formal program of annual inspection and maintenance for the dam. Inspection should be performed by a professional engineer experienced in the design and construction of dams and recorded on standard check list forms. Inspection check lists and complete records of maintenance should be included in a permanent file. Annual maintenance should include removal of brush and trees from the embankment, clearing of the discharge pipes and gate valves and repair of eroded areas. The current practice of periodically lowering the lake for maintenance purposes should be continued and at least once every five years the lake should be lowered completely at which time the lake should be cleaned and normally submerged portions of the dam and spillway should be inspected and repaired.

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congressman James A. Courter of the Thirteenth District. Under the provision of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

NAPEN-D
Honorable Brendan T. Byrne

An important aspect of the Dam Safety Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely,

JAMES G. TON
Colonel, Corps of Engineers
District Engineer

1 Incl
As stated

Copies furnished:
Mr. Dirk C. Hofman, P.E., Deputy Director
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

Mr. John O'Dowd, Acting Chief
Bureau of Flood Plain Management
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

LAKE THERESE (NJ00349)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 30 April 1979 by Storch Engineers under contract to the State of New Jersey. The State, under agreement with the U.S. Army Engineer District, Philadelphia, had this inspection performed in accordance with the National Dam Inspection Act, Public Law 92-367.

Lake Therese Dam, initially listed as a high hazard potential structure, but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in good overall condition and the spillway is adequate. To insure adequacy of the structure, the following remedial actions should be initiated within six months from the date of approval of this report:

a. The 12-inch and 24-inch outlet pipes should be restored to operable condition to provide drawdown capability for the reservoir. Also, an upstream valve should be installed on the 24-inch pipe to prevent full reservoir pressure in the pipe through the embankment.

b. Trees on the embankment should be cut off at the ground surface with minimal disturbance of the existing ground.

c. The south radial gate should be repaired to eliminate leakage.

d. The owner should initiate a formal program of annual inspection and maintenance for the dam. Inspections should be performed by a professional engineer experienced in the design and construction of dams and recorded on standard check list forms. Inspection check lists and complete records of maintenance should be included in a permanent file. Annual maintenance should include removal of brush and trees from the embankment, clearing of the discharge pipes and gate valves and repair of eroded areas. The current practice of periodically lowering the lake for maintenance purposes should be continued and at least once every five years the lake should be lowered completely at which time the lake should be cleaned and normally submerged portions of the dam and spillway should be inspected and repaired.

APPROVED: James G. Ton

JAMES G. TON
Colonel, Corps of Engineers
District Engineer

DATE: 22 Sep 1979

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Lake Therese Dam, NJ00349
State Located:	New Jersey
County Located:	Morris
Drainage Basin:	Raritan River
Stream:	McVickers Brook
Date of Inspection:	April 30, 1979

Assessment of General Condition of Dam

Based on available records, past operational performance, a visual inspection and Phase I engineering analysis, Lake Therese Dam is assessed as being in good overall condition.

Based on investigations of the downstream flood plain made in connection with this report, it is recommended that the hazard potential classification be downgraded from high to significant hazard.

The spillway is capable of passing the designated spillway design flood (100-year storm) without an overtopping of the dam and, therefore, is assessed as being adequate.

It is recommended that the following measures be undertaken by the owner in the near future:

1) The 12-inch and 24-inch outlet pipes should be restored to operable condition to provide drawdown capability for the reservoir. Also, an upstream valve should be installed on the 24-inch pipe to prevent full reservoir pressure in the pipe through the embankment.

2) Trees on the embankment should be cut off at the ground surface with minimal disturbance of the existing ground.

3) The south radial gate should be repaired to eliminate leakage.

The owner should in the near future initiate a formal program of annual inspection and maintenance for the dam. The inspections should be performed by a professional engineer experienced in the design and construction of dams and recorded on standard check list forms. Inspection check lists, complete records of maintenance and post-construction changes should be included in a permanent file, available for public inspection. Annual maintenance should include removal of brush and trees from the embankment, cleaning of the outlet pipes and gate valves, and repair of eroded areas.

The current practice of periodically lowering the lake for maintenance purposes should be continued and at least once every five years the lake should be lowered completely at which time the lake should be cleaned and normally submerged portions of the dam and spillway should be inspected and repaired.

Richard J. McDermott

Richard J. McDermott, P.E.

John E. Gribbin

John E. Gribbin, P.E.

OVERVIEW - LAKE THERESE DAM

30 APRIL 1979

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 30214. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. It is important to note that the condition of dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that the unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

LAKE THERESE DAM, I.D. NJ00349

SECTION 1: PROJECT INFORMATION

1.1 General

a. Authority

Public Law 92-367, August 8, 1972 authorized the Secretary of the Army, through the Corps of Engineers to initiate a National Program of Dam Inspection throughout the United States. The Division of Water Resources of the New Jersey Department of Environmental Protection (NJDEP) in cooperation with the Philadelphia District of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the State of New Jersey. Storch Engineers has been retained by the NJDEP to inspect and report on a selected group of these dams. The NJDEP is under agreement with the Philadelphia District of the Corps of Engineers.

b. Purpose of Inspection

The visual inspection of Lake Therese Dam was made on April 30, 1979. The purpose of the inspection was to make a general assessment of the structural integrity and operational adequacy of the dam structure and its appurtenances.

1.2 Description of Project

a. Dam and Appurtenances

Lake Therese Dam is an earthfill dam with a concrete spillway fitted with timber flashboards and steel radial gates. The embankment extends north to south and is measured to be 270 feet long and 29 feet high. The upstream slope is 2.5 horizontal to 1 vertical and downstream slope 2 horizontal to 1 vertical. An impervious core and a concrete cutoff wall are located inside the embankment along its entire length. Also, a system of rock drains is located within the downstream portion of the dam. A porous wall drain pipe is located at the south end of the dam. The upstream slope is protected by riprap and all other surfaces are covered with a good stand of grass.

The spillway is located near the south end of the embankment and consists of three sections separated by two concrete piers.

The center section is 20 feet long and is composed of timber flashboards set on a concrete ogee shaped sill. The two outer sections are each 9.5 feet long and are composed of steel radial (Taintor) gates resting on concrete ogee shaped sills. These gates serve as outlet works when lifted and as part of the spillway when in their lowered positions. The flashboards reportedly are designed to be collapsible, thus forming an emergency discharge control device.

The elevation of the spillway crest formed by the flashboards and outlet gates is 364.0 (N.G.V.D.) while the elevation of the dam crest is 369.0. The inverts of the outlet gates are set at elevations of 360.0 and 362.0, respectively.

Two gated outlet pipes are located within the dam. A 12-inch pipe transversely penetrates the concrete portion of the spillway, while a 24-inch pipe transversely penetrates the embankment near its center.

The concrete training walls of the spillway extend downstream approximately 100 feet to a road bridge and form the sides of a discharge channel. The bottom of the discharge channel is composed of stepped concrete slabs.

b. Location

Lake Therese Dam is located in the Schiff Boy Scout Reservation, in the Township of Mendham, Morris County, New Jersey. Constructed across McVickers Brook, it impounds Lake Therese which is also known as Pleasant Valley Lake. McVickers Brook joins the North Branch, Raritan River approximately 0.5 mile downstream from the dam.

c. Size and Hazard Classification

Size and Hazard Classification criteria presented in "Recommended Guidelines for Safety Inspection of Dams", published by the U.S. Army Corps of Engineers are as follows:

SIZE CLASSIFICATION

	Impoundment	
Category	Storage (Ac-ft)	Height (Ft)
Small	< 1000 and ≥ 50	< 40 and ≥ 25
Intermediate	≥ 1000 and $< 50,000$	≥ 40 and < 100
Large	$\geq 50,000$	≥ 100

HAZARD POTENTIAL CLASSIFICATION

Category	Loss of Life (Extent of Development)	Economic Loss (Extent of Development)
Low	None expected (no permanent structures for human habitation)	Minimal (Undeveloped to occasional structures or agriculture)
Significant	Few (No urban developments and no more than a small number of inhabitable structures)	Appreciable (Notable agriculture, industry or structures)
High	More than few	Excessive (Extensive community, industry or agriculture)

The following characteristics relating to size and downstream hazard for Lake Therese Dam have been determined for this Phase I assessment:

Storage: 125 Acre-feet

Height: 29 feet

Potential Loss of Life:

One dwelling is located in the downstream flood plain approximately 1800 feet from the dam. The dwelling would be inundated above the first floor as a result of dam failure due to overtopping.

Potential Economic Loss:

Three road bridges and one dwelling could be damaged as a result of dam failure.

Therefore, Lake Therese Dam is classified as "Small" size with "Significant" hazard potential.

d. Ownership

Lake Therese Dam is owned by the National Council of Boy Scouts of America, New Brunswick, New Jersey 08902. Reportedly, the land upon which the dam is situated is scheduled to be sold to American Telephone and Telegraph Company in the near future.

e. Purpose of Dam

The purpose of the dam is the impoundment of a recreational lake facility.

f. Design and Construction History

The dam was designed in 1932 by the firm of Sanderson and Porter. Reportedly, no alterations nor repairs have been made since the dam was constructed.

g. Normal Operational Procedure

Maintenance of Lake Therese is performed by the maintenance crew of Schiff Boy Scout Reservation. Regular maintenance consists of lowering the lake in Spring and Fall to remove and replace docks. Reportedly, the lowering is achieved by the radial gates located at the spillway. Other maintenance is reportedly done on an "as needed" basis.

1.3 Pertinent Data

a. Drainage Area	3.2 square miles
b. Discharge at Damsite	
Maximum flood at damsite	Unknown
Outlet works at normal pool elevation	241 cfs
Spillway capacity at top of dam (gates closed)	1334 cfs

c. Elevation (Feet above MSL)

Top of Dam	369.0
Maximum pool-design surcharge	369.0
Full flood control pool	N.A.
Recreation pool	364.0
Spillway crest	364.0
Upstream portal invert diversion tunnel	N.A.
Stream bed at centerline of dam	340.0
Maximum tailwater	N.A.

d. Reservoir

Length of maximum pool	2900 feet
Length of recreation pool	2400 feet
Length of flood control pool	N.A.

e. Storage (Acre-feet)

Recreation pool	125 acre-feet
Flood control pool	N.A.
Maximum pool	185 acre-feet
Top of dam	185 acre-feet

f. Reservoir Surface (Acres)

Top of dam	20.2 acres (estimated)
Maximum pool	20.2 acres (estimated)
Flood control pool	N.A.
Recreation pool	15.6 acres
Spillway crest	15.6 acres

g. Dam

Type	Earthfill
Length	365 feet
Height	29 feet
Sideslopes - Upstream	2½ horiz. to 1 vert.
- Downstream	2 horiz. to 1 vert.
Zoning	Impervious core flanked by pervious fill
Impervious core	Clay
Cutoff	Concrete wall
Grout curtain	None

h. Diversion and Regulating Tunnel — N.A.

i. Spillway

Type	Timber flashboards and two steel radial gates on concrete ogee crest.
Length of weir - flashboards	20 feet
- two radial gates	19 feet
Crest elevation	364.0
Gates	Flashboards are collapsible. Radial gates serve as weirs when in closed positions.
Upstream channel	N.A.
Downstream channel	Concrete channel 32' to 42' wide

j. Regulating Outlets

Two steel radial (Taintor) gates - each 9.5' long.
Two gated outlet pipes. (Abandoned)

SECTION 2: ENGINEERING DATA

2.1 Design

Plans of the original construction by Sanderson and Porter are as follows:

1. Plan and Longitudinal Section
2. Cross Sections of Dam and Spillway
3. Spillway and Upstream Retaining Wall
4. Spillway and Downstream Retaining Wall

No design calculations for the dam and spillway are available.

Based on borings shown on the plans by Sanderson and Porter, the soil description of the dam site consists of 4 feet of loam overlying 7 to 10 feet of Gneiss, Granite Blocks and Fragments with bedrock consisting of Gneiss and Granite.

2.2 Construction

No information concerning construction of the dam is available.

2.3 Operation

No records of operation of the lake or dam are available. Reportedly, the dam has been maintained in good condition.

2.4 Evaluation

a. Availability

Available engineering information is limited to that which is on file with the Boy Scouts of America. The file contains construction drawings, maps of Lake Therese and topography of the lake vicinity. The file is available at the National Office - Boy Scouts of America, North Brunswick, New Jersey 08902.

b. Adequacy

The available construction plans were of assistance in the performance of a Phase I evaluation.

c. Validity

Information that could be verified was found to be valid within a reasonable allowance for error.

SECTION 3: VISUAL INSPECTION

3.1 Findings

a. General

The inspection of Lake Therese Dam took place on April 30, 1979 by members of the staff of Storch Engineers. A copy of the visual inspection check list is contained in Appendix 1. The following procedures were employed for the inspection:

1. The embankment of the dam, appurtenant structures and adjacent areas were examined.
2. The embankment and appurtenant structures were measured and key elevations determined by a surveyor's level.
3. The embankment and appurtenant structures and adjacent areas were photographed.
4. Typical sections of the downstream channel were determined by hand level.

b. Dam

The horizontal alignment of the dam is straight and appears to be in conformance with the construction drawings. The crest appears to be level with no low areas and no signs of structural instability or seepage were apparent. The upstream slope of the embankment is covered with riprap in good condition. The downstream side is covered with a good stand of grass with some bushes for landscaping purposes. The overall condition of the embankment appears to be good.

The generalized soil description of the dam site consists of recent alluvium composed of stratified materials deposited by streams overlying residual soil, weathered to comparatively great depths. The lower, undisturbed parts of the residual soil generally retain the banded structure of the parent rock to a remarkable degree. The residual soil is overlying gneissic bedrock.

c. Appurtenant Structures

The training walls of the spillway continue as retaining walls for the discharge channel. The concrete apron and retaining walls are in good condition. The ogee portion of the spillway and the flashboards and gates appeared to be in generally good condition. Some leakage was observed at the side of the south radial gate. The leakage appeared to be caused by localized spalling of the concrete surface adjacent to the gate and deterioraton of the rubber seal along the edge of the gate.

The timber walkway across the spillway also appeared to be in good condition. The operating mechanisms for the radial gates appeared to be in workable condition. The operating stem for one of the abandoned outlet pipes is severely rusted at the water line, although the operating mechanism appeared to be in generally satisfactory condition.

d. Reservoir Area

Lake Therese is long and narrow, averaging approximately 300 feet in width with a length of 2400 feet. The surrounding area is used for Boy Scout activities and contains a few lake related structures for recreational purposes. The terrain of the area has slopes ranging from 1 to 10 percent.

e. Downstream Channel

The spillway discharges into a narrow winding well defined channel which joins the North Branch, Raritan River approximately 0.5 mile downstream. No significant obstructions were observed in the vicinity of the dam.

SECTION 4: OPERATIONAL PROCEDURES

4.1 Procedures

The level of water in Lake Therese is regulated naturally by discharge over the flashboards and radial gates at the spillway. At times of intense storms, reportedly the gates are raised to regulate the water level.

Twice a year, the lake is lowered for the purpose of repairing the docks. The drawdown is accomplished by raising the radial gates and requires an estimated one day to be completed.

The outlet pipes are reportedly no longer in use.

4.2 Maintenance of Dam

The only regular maintenance performed for the embankment is the mowing of grass on the embankment surfaces. Other maintenance is done on an "as-needed" basis. There was evidence at the time of inspection that some of the boards in the timber walkway had been recently replaced.

4.3 Maintenance of Operating Facilities

Regular maintenance of the operating facilities includes inspection of the timber flashboards and steel gates when the lake is lowered. Other maintenance is performed on an "as needed" basis. The most recent maintenance reportedly consisted of repairs to the south gate in 1978. Also, in 1968 the timber flashboards were replaced, reportedly utilizing cypress wood for the new flashboards. Other repairs have included painting the gates and pointing the concrete work.

4.4 Description of Warning System

Reportedly, a warning system is maintained by the maintenance staff of the Schiff Boy Scout Reservation. Staff members observe lake levels during times of intense flooding and then, if necessary, raise the radial gates to attenuate flood levels.

4.5 Evaluation of Operational Adequacy

The operation of the dam has been adequate to the extent that the dam reportedly has never been overtopped.

Maintenance documentation is not available. The only observed area of inadequate maintenance is the unrepaired condition of the operating stem of the abandoned outlet works.

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. Design Data

The quantity of storm water runoff that the spillway should be able to pass without an overtopping of the dam is based on the size and hazard classification of the dam. This runoff, called the spillway design flood (SDF), is described in terms of frequency or probable maximum flood (PMF) depending on the extent of the dam's size and potential hazard. According to the "Recommended Guidelines for Safety Inspection of Dams," published by the U.S. Army Corps of Engineers, the SDF for Lake Therese Dam falls in a range of 100-year frequency to 1/2 PMF. For this case, the low end of the range, 100-year frequency is chosen since the factors used to select size and hazard classification are on the low side of their respective ranges.

The SDF peak flow computed for Lake Therese Dam is 774 c.f.s., as calculated in accordance with analytical procedures contained in Report 38 published by the NJDEP.

Computations used to determine the spillway discharge capacity are contained in Appendix 4. The radial gates and the flash boards are assumed to have outflow characteristics of a sharp crested weir. The spillway discharge, with gates closed, is computed to be 1334 c.f.s. with water level equal to the dam crest. Since this value is greater than the computed SDF peak (774 c.f.s.) the spillway is considered to be adequate according to criteria developed by the U.S. Army Corps of Engineers.

b. Experience Data

According to personnel at the Schiff Boy Scout Reservation, the dam has not been damaged nor overtopped. The highest known lake level was approximately 18 inches below the dam crest and occurred in connection with a storm in 1971. At that time, the dwelling located 1800 feet downstream from the dam experienced approximately 4 feet of water in its basement.

c. Visual Observation

There was no evidence found at the time of inspection of overtopping of the dam.

d. Overtopping Potential

Computations outlined in Appendix 4 indicate that the dam would not be overtopped during storms equivalent to the designated SDF.

SECTION 6: STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

The embankment appeared, at the time of inspection, to be outwardly structurally stable with no evidence of cracks displacement, differential settlement or seepage.

b. Design and Construction Data

No structural stability analyses for the dam or appurtenant structures are available.

c. Operating Records

No operating records for the dam are available. The water level of Lake Therese is not monitored.

d. Post Construction Changes

No records of any post construction changes are available.

e. Seismic Stability

Lake Therese Dam is located in seismic Zone 1 as defined in "Recommended Guidelines for Safety Inspection of Dams" which is a zone of very low seismic activity. Experience indicates that dams in Seismic Zone 1 will have adequate stability under seismic loading conditions if stable under static loading conditions. Lake Therese Dam appeared, at the time of inspection, to be stable under static loading conditions.

SECTION 7: ASSESSMENT AND RECOMMENDATIONS

7.1 Dam Assessment

a. Safety

Based on hydraulic and hydrologic analyses outlined in Section 5 and Appendix 4, the spillway of Lake Therese Dam is considered to be adequate according to criteria developed by the U.S. Army Corps of Engineers.

The structural integrity of the dam appears to be satisfactory based on field investigations. No reported nor written evidence was found that would contradict this assessment.

b. Adequacy

Information sources for this study include: 1) field inspection, 2) construction drawings, 3) USGS quadrangles and 4) consultation with personnel of the Boy Scout reservation. The information obtained is sufficient to allow a Phase I assessment as outlined in "Recommended Guidelines for Safety Inspection of Dams."

Some of the absent data are as follows:

1. Stream and lake elevation gaging records.
2. Maintenance documentation.
3. Design calculations.
4. Construction history.

c. Necessity for Additional Data/Evaluation

Additional data or evaluation are not considered necessary for this assessment of Lake Therese Dam.

7.2 Recommendations

a. Remedial Measures

It is recommended that the following measures be undertaken by the owner in the near future:

1) The 12-inch and 24-inch outlet pipes should be restored to operable condition to provide drawdown capability for the reservoir. Also, an upstream valve should be installed on the 24-inch pipe to prevent full reservoir pressure in the pipe through the embankment.
2) Trees on the embankment should be cut off at the ground surface with minimal disturbance of the existing ground.
3) The south radial gate should be repaired to eliminate leakage.

b. Maintenance

The owner should initiate in the near future a formal program of annual inspection and maintenance for the dam. The inspections should be performed by a professional engineer experienced in the design and construction of dams and recorded on standard check list forms. Inspection check list, complete records of maintenance should be included in a permanent file available for public inspection. Annual maintenance should include removal of brush and trees from the embankment, clearing of the discharge pipes and gate valves and repair of eroded areas.

The current practice of periodically lowering the lake for maintenance purposes should be continued and at least once every five years the lake should be lowered completely at which time the lake should be cleaned and normally submerged portions of the dam and spillway should be inspected and repaired.

PLATES

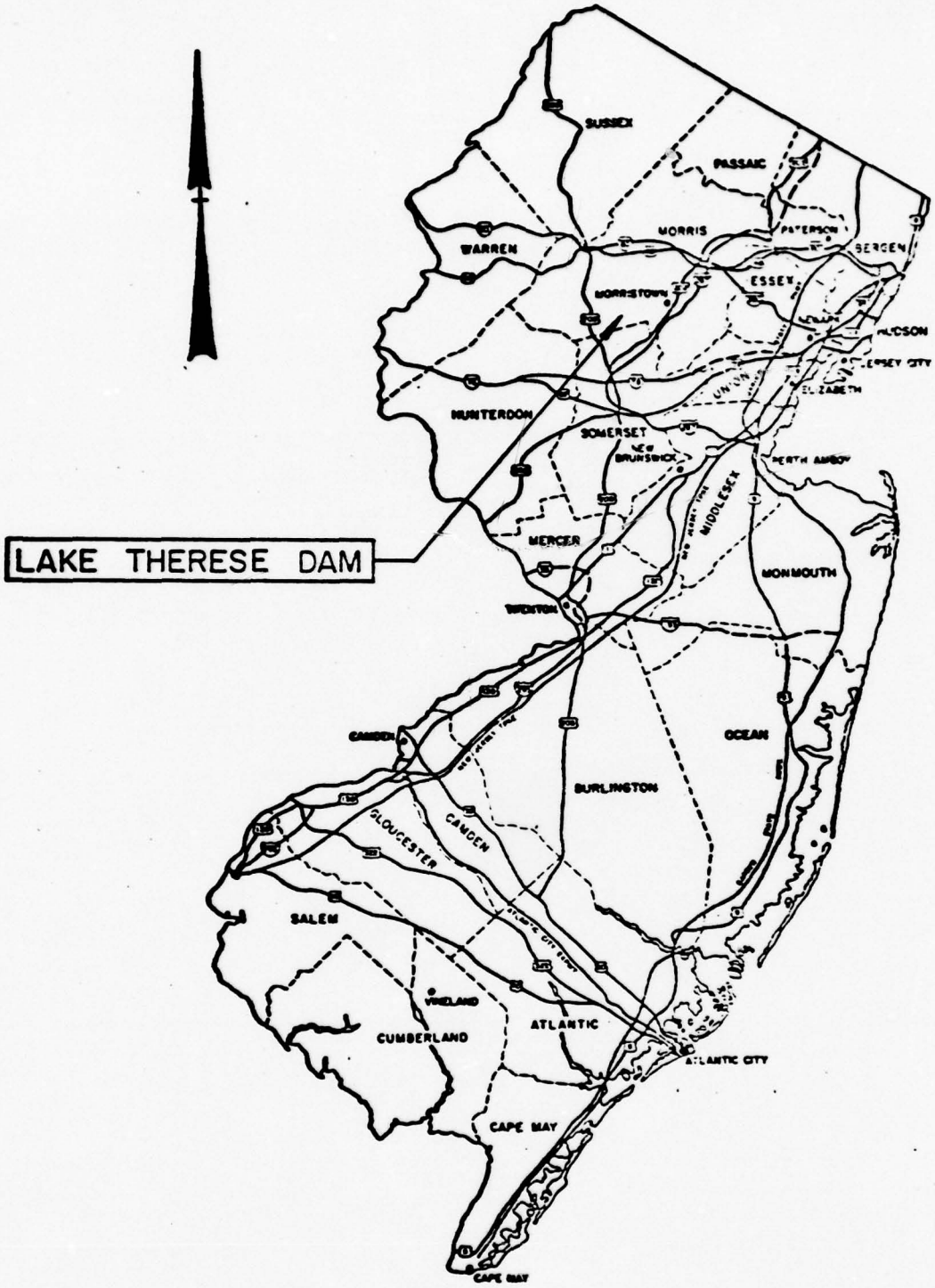


PLATE 1

STORCH ENGINEERS FLORHAM PARK, NEW JERSEY	INSPECTION AND EVALUATION OF DAMS KEY MAP LAKE THERESE DAM
DIVISION OF WATER RESOURCES N.J. DEPT. OF ENVIR. PROTECTION TRENTON, NEW JERSEY	I.D. N.J. 00349 | SCALE: NONE DATE: JUNE, 1979

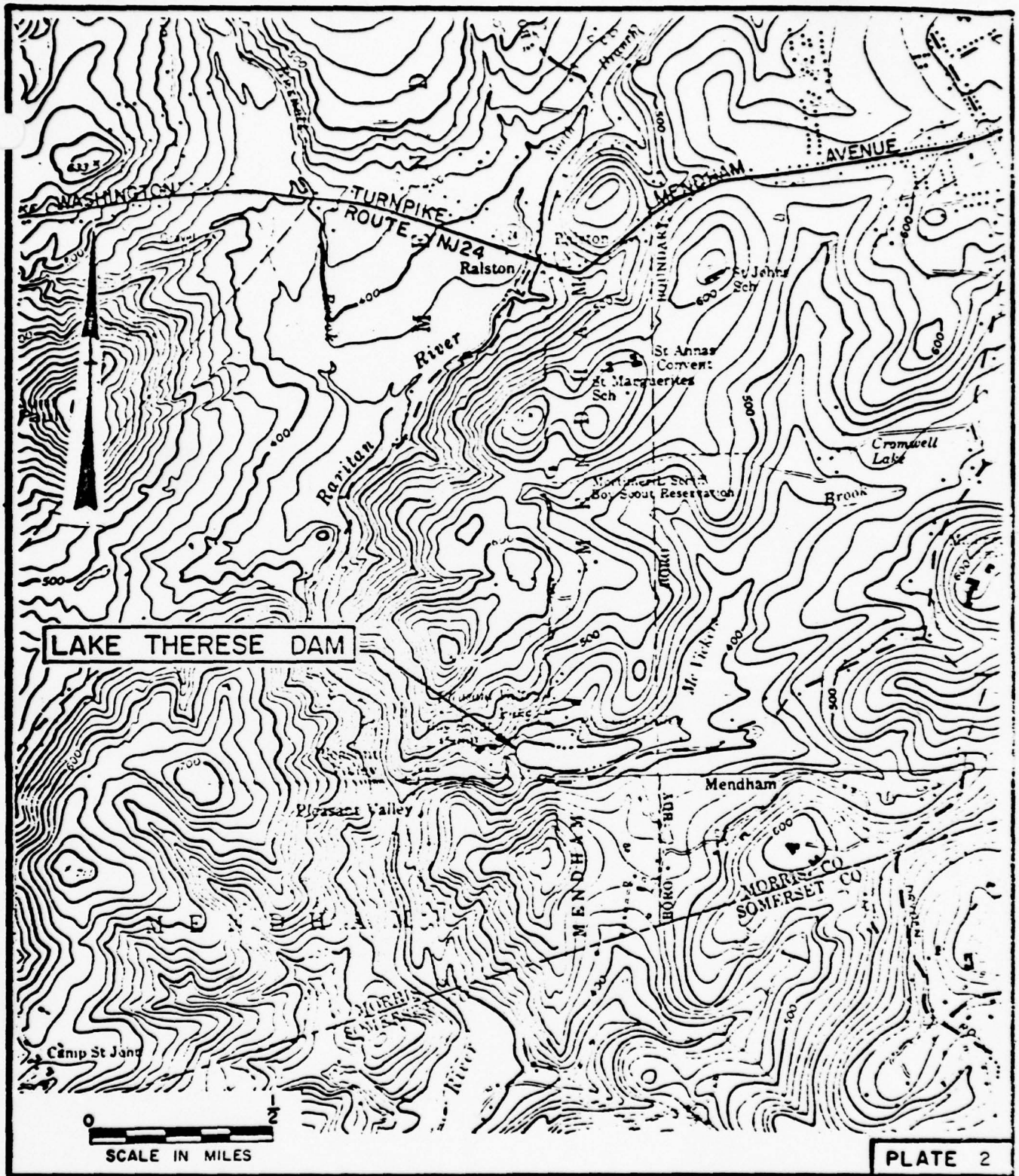


PLATE 2

STORCH ENGINEERS
FLORHAM PARK, NEW JERSEY

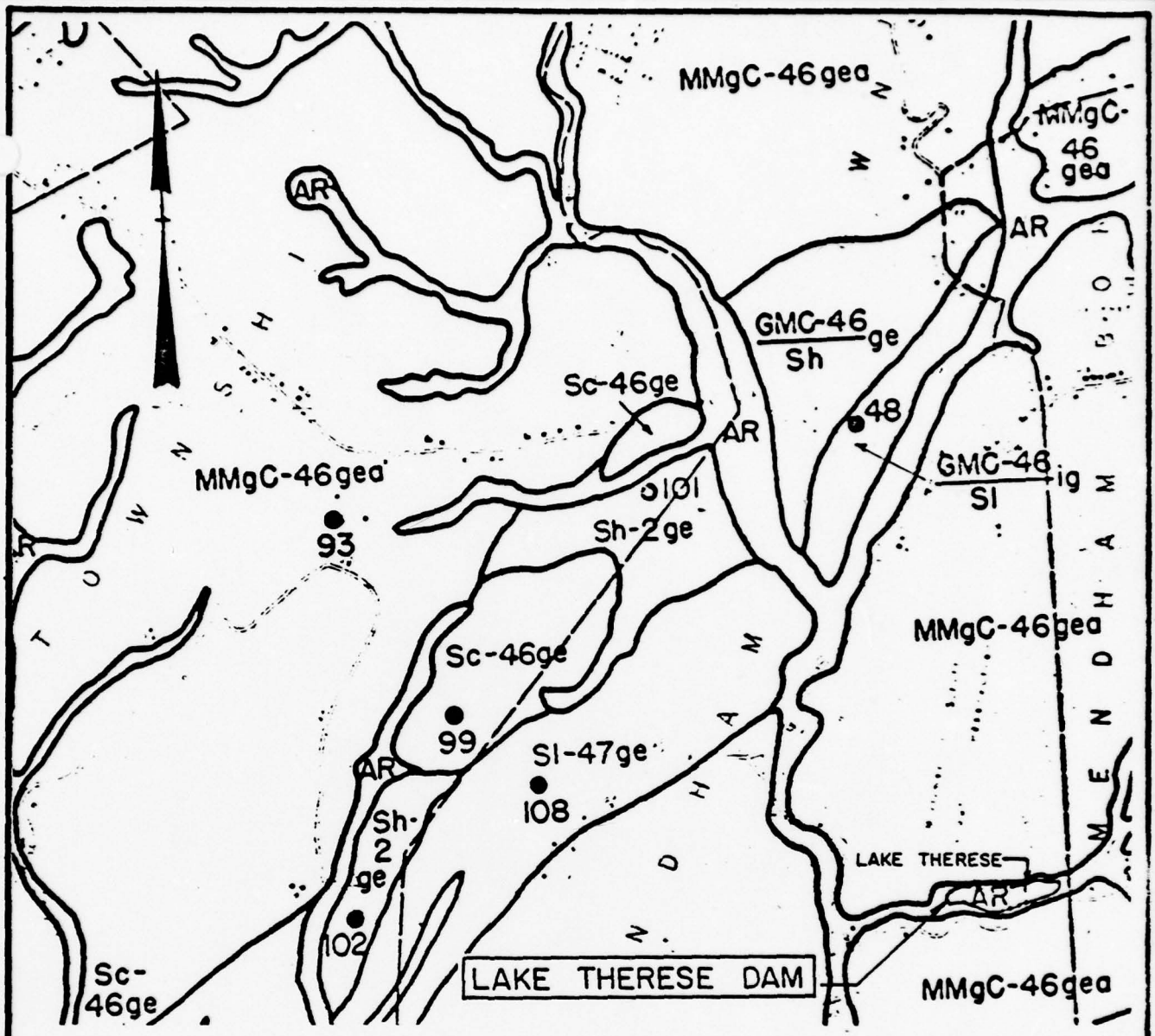
DIVISION OF WATER RESOURCES
N.J. DEPT. OF ENVIR. PROTECTION
TRENTON, NEW JERSEY

INSPECTION AND EVALUATION OF DAMS

VICINITY MAP

LAKE THERESE DAM

I.D. NJ00349	SCALE: AS SHOWN
	DATE: JUNE, 1979



Legend

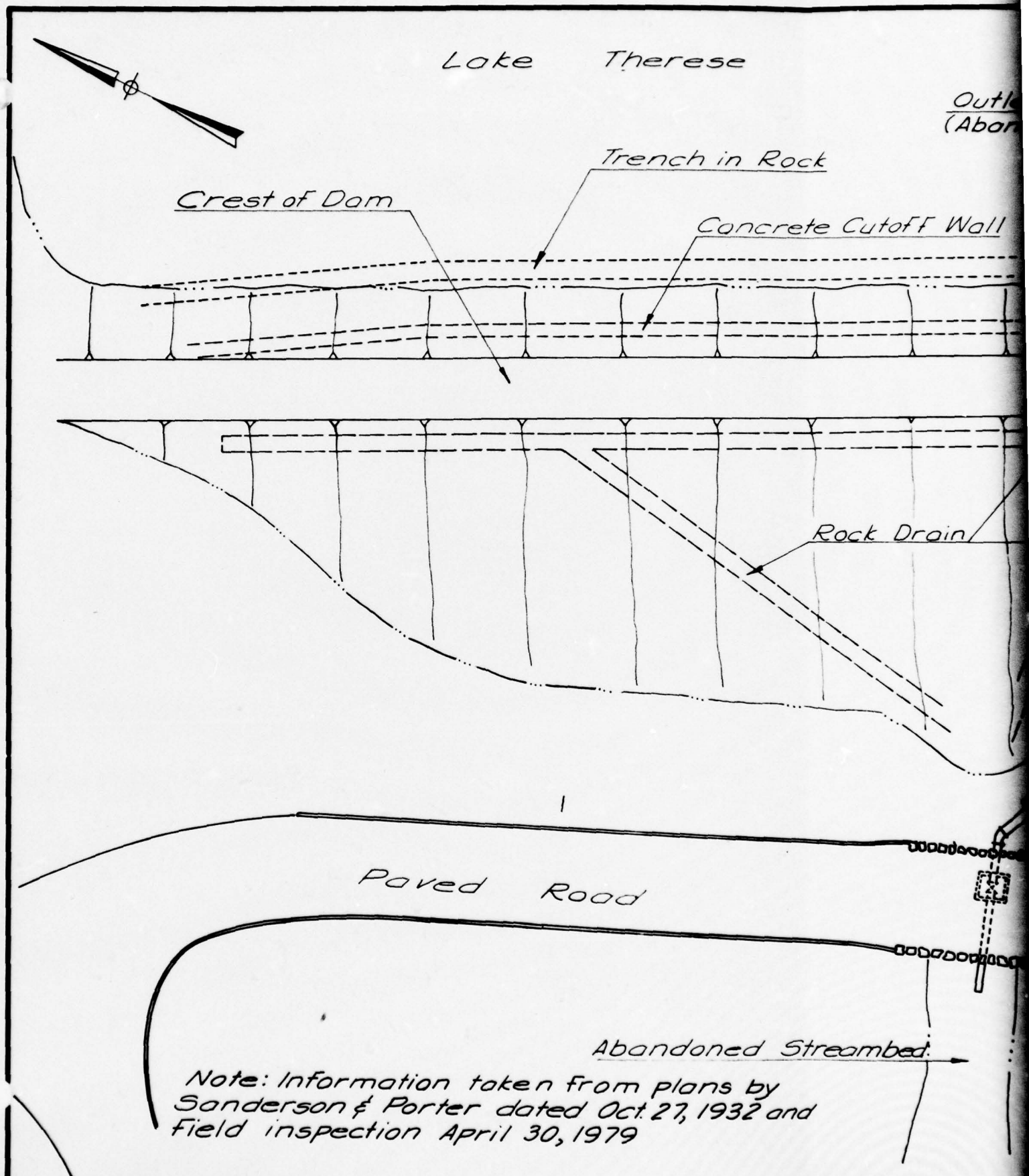
AR — Recent alluvium composed of stratified materials deposited by streams.

MMgC-46 — Residual soil weathered to comparatively great depths, overlying gneissic bedrock.

NOTE: Information taken from Rutgers University Soil Survey of New Jersey, Report No. 9, Morris County, and Geologic Map of New Jersey prepared by Lewis and Kummel.

PLATE 3

STORCH ENGINEERS FLORHAM PARK, NEW JERSEY	INSPECTION AND EVALUATION OF DAMS SOIL MAP LAKE THERESE DAM
DIVISION OF WATER RESOURCES N.J. DEPT. OF ENVIR. PROTECTION TRENTON, NEW JERSEY	I.D. NJ00349 — SCALE: NONE DATE: JULY, 1979


Lake Therese
Outle
(Abar
Trench in Rock
Crest of Dam
Concrete Cutoff Wall
Rock Drain
Paved Road
Abandoned Streambed
Note: Information taken from plans by Sanderson & Porter dated Oct. 27, 1932 and Field inspection April 30, 1979

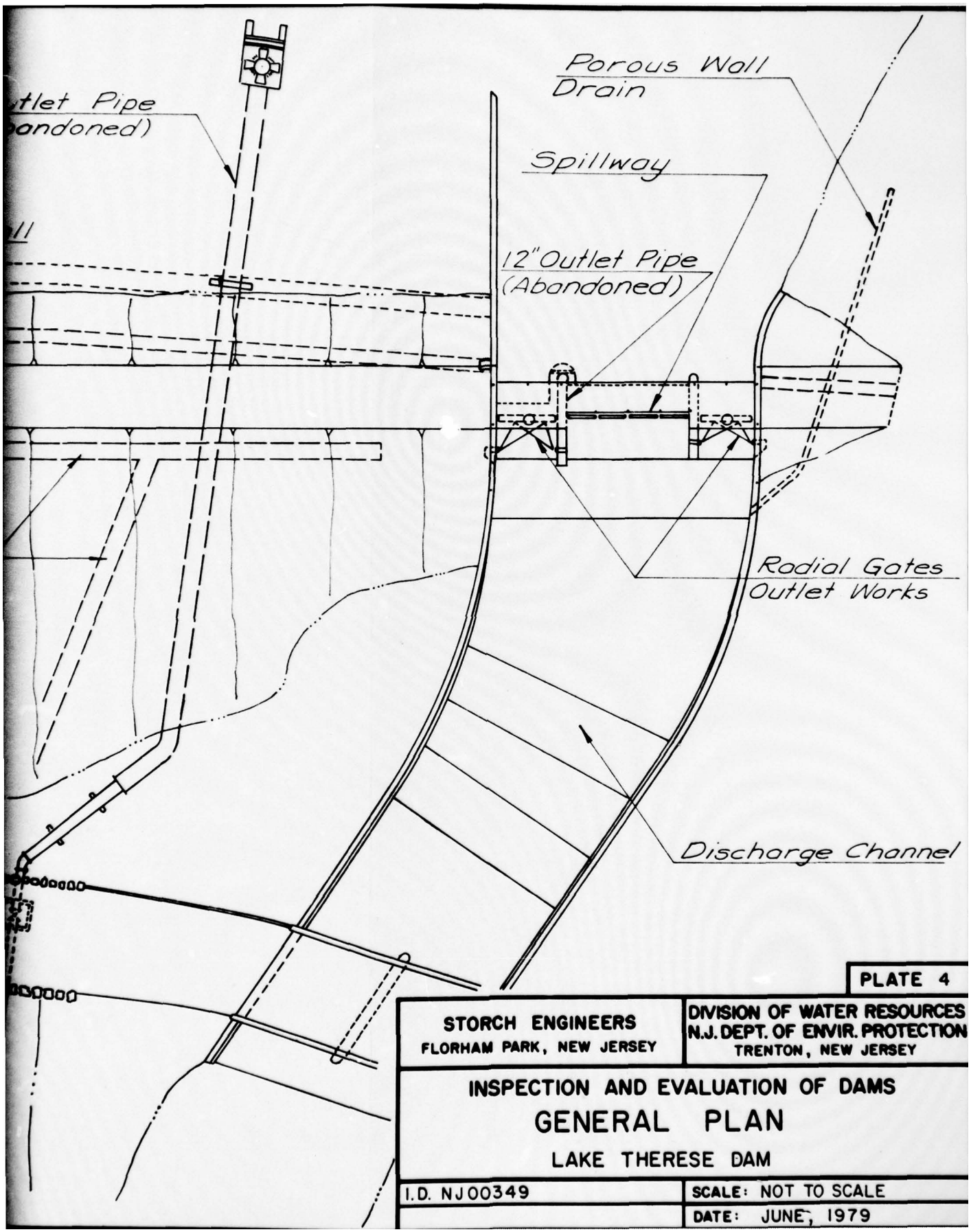


PLATE 4

STORCH ENGINEERS
FLORHAM PARK, NEW JERSEY

DIVISION OF WATER RESOURCES
N.J. DEPT. OF ENVIR. PROTECTION
TRENTON, NEW JERSEY

INSPECTION AND EVALUATION OF DAMS

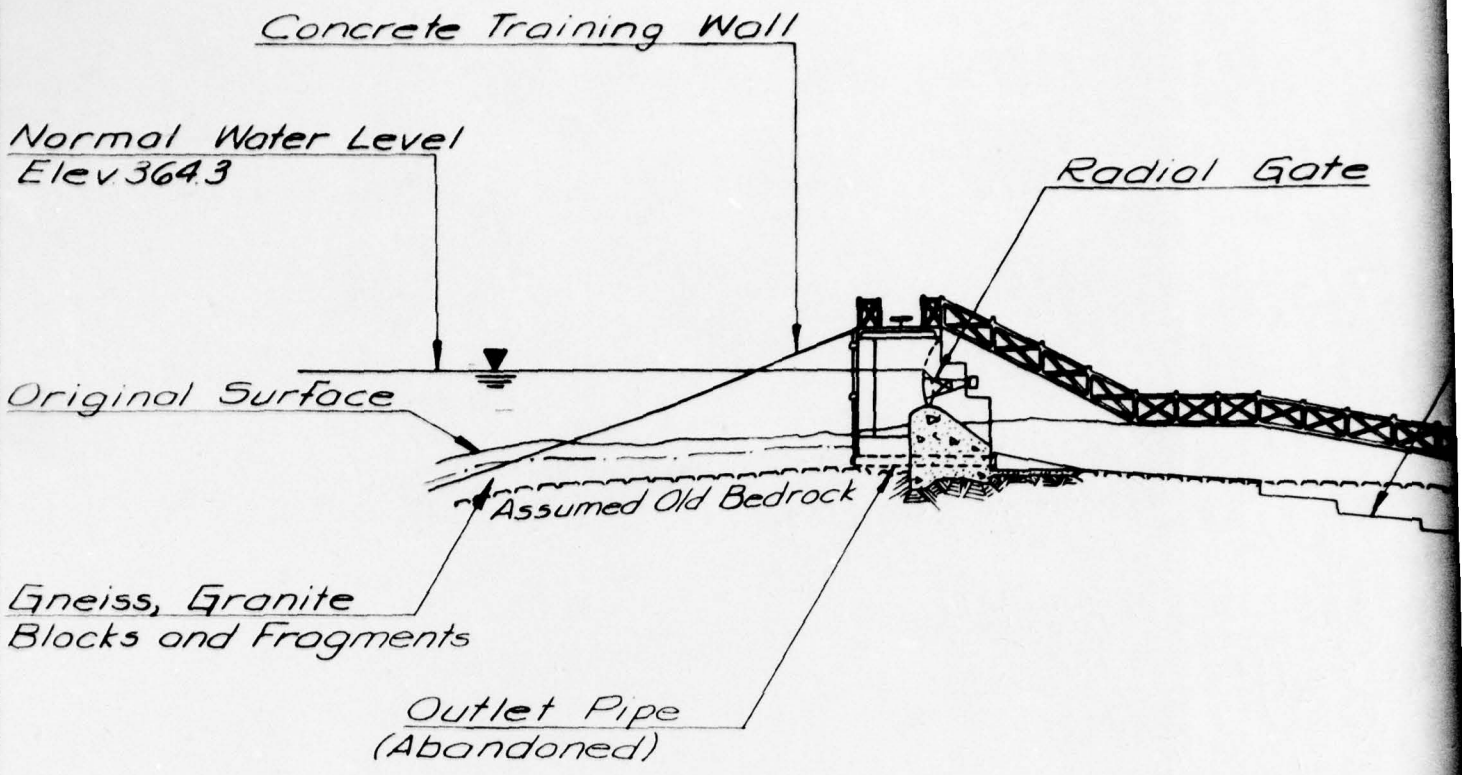
GENERAL PLAN

LAKE THERESE DAM

I.D. NJ00349

SCALE: NOT TO SCALE

DATE: JUNE, 1979



Note: Information taken from plans by Sanderson & Porter dated Oct 27, 1932 and field inspection April 30, 1979.

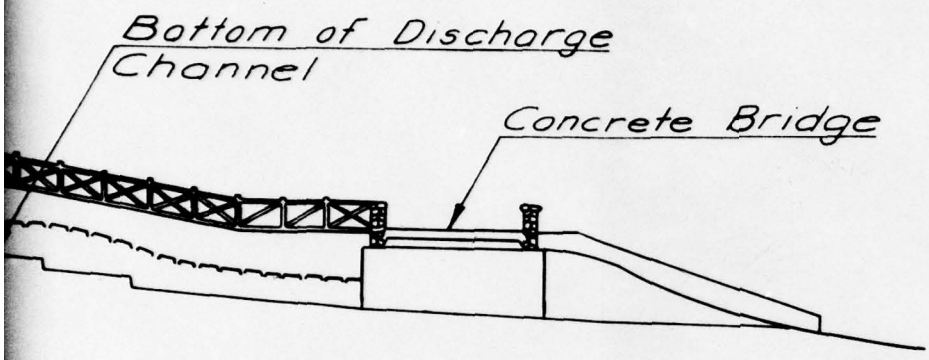


PLATE 5

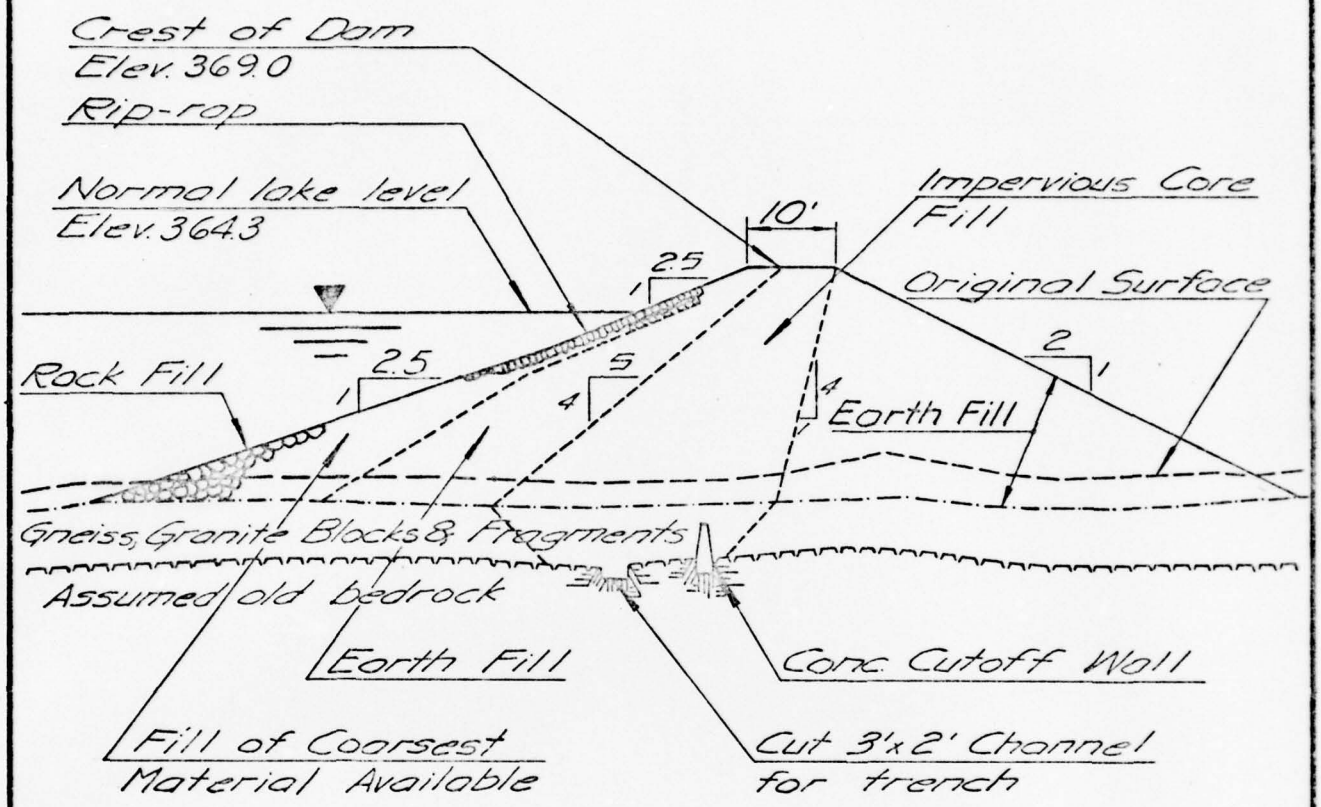
STORCH ENGINEERS FLORHAM PARK, NEW JERSEY	DIVISION OF WATER RESOURCES N.J. DEPT. OF ENVIR. PROTECTION TRENTON, NEW JERSEY

INSPECTION AND EVALUATION OF DAMS

SPILLWAY SECTION

LAKE THERESE DAM

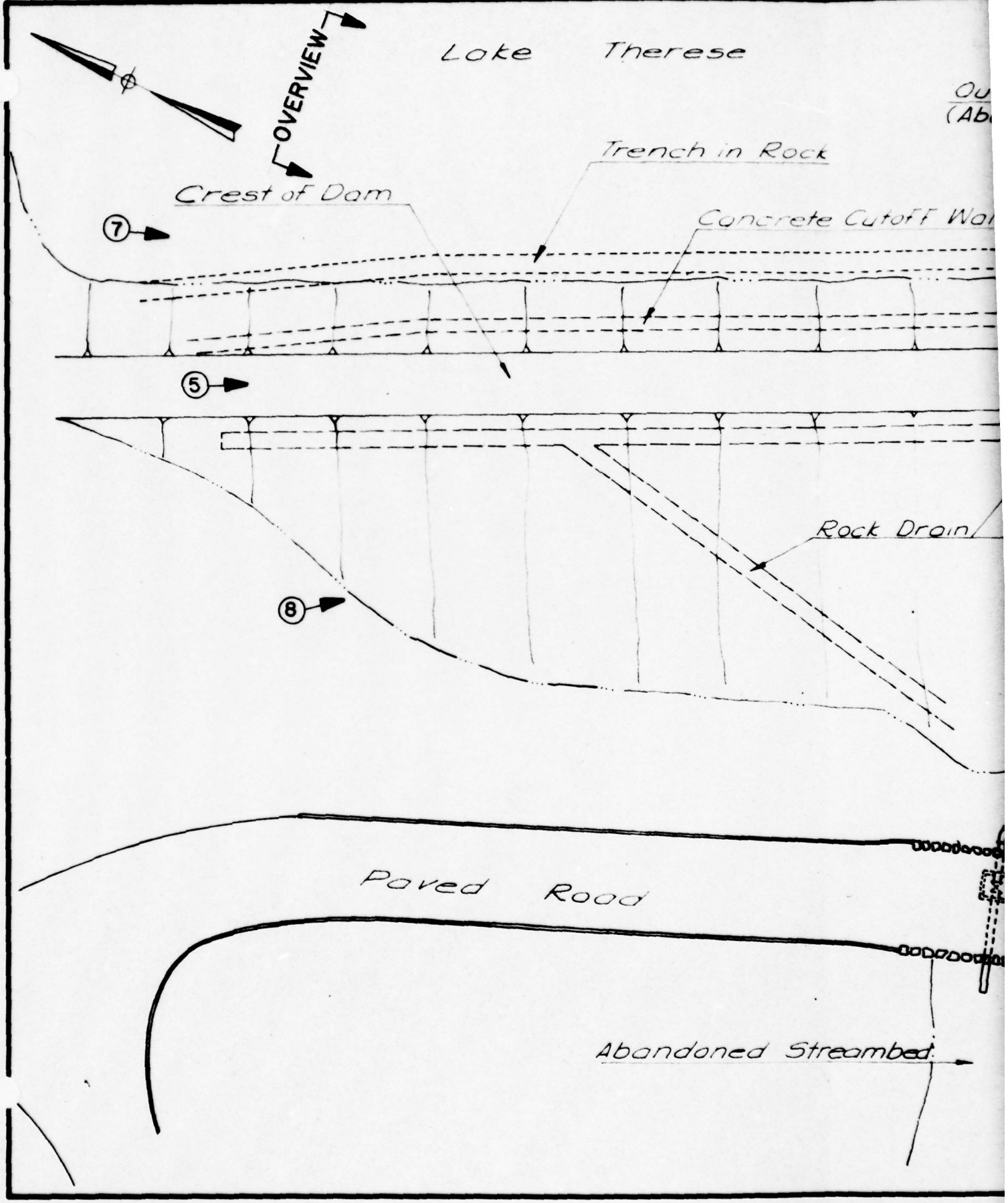
I.D. N.J. 00349	SCALE: NOT TO SCALE
	DATE: JULY, 1979



Note: Information taken from plans by Sonderson & Porter dated Oct. 27, 1932 and Field inspection April 30, 1979.

PLATE 6

STORCH ENGINEERS FLORHAM PARK, NEW JERSEY	INSPECTION AND EVALUATION OF DAMS **DAM SECTION** LAKE THERESE DAM
DIVISION OF WATER RESOURCES N.J. DEPT. OF ENVIR. PROTECTION TRENTON, NEW JERSEY	I.D. NJ00349 / SCALE: NOT TO SCALE DATE: JUNE, 1979


Lake Therese
OVERVIEW
Trench in Rock
Crest of Dam
Concrete Cutoff Wall
7
5
8
Rock Drain
Paved Road
Abandoned Streambed

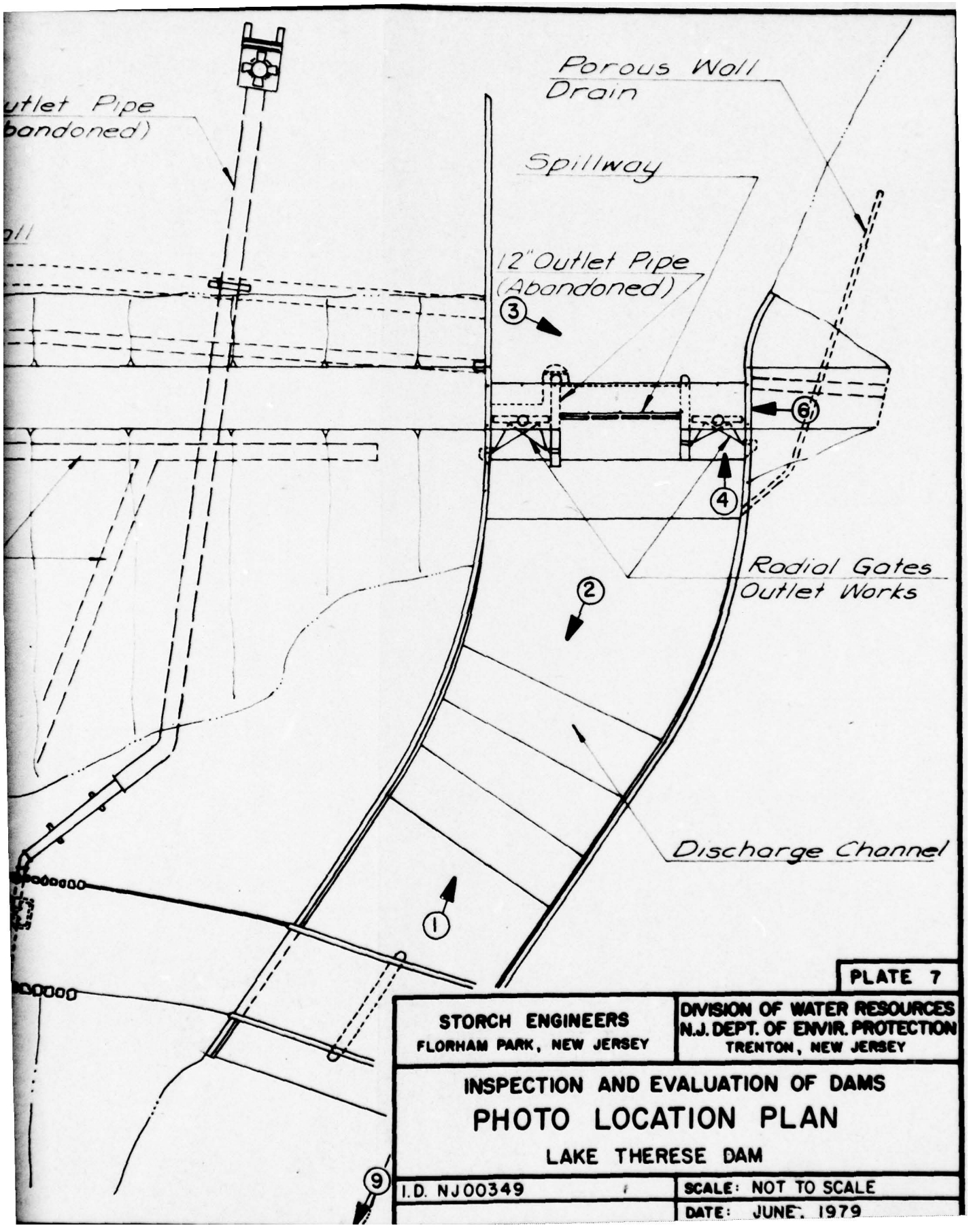


PLATE 7

STORCH ENGINEERS
FLORHAM PARK, NEW JERSEY

DIVISION OF WATER RESOURCES
N.J. DEPT. OF ENVIR. PROTECTION
TRENTON, NEW JERSEY

INSPECTION AND EVALUATION OF DAMS

PHOTO LOCATION PLAN

LAKE THERESE DAM

I.D. NJ00349

SCALE: NOT TO SCALE

DATE: JUNE, 1979

APPENDIX 1

Check List - Visual Inspection

Check List - Engineering Data

Check List
Visual Inspection
Phase I

Name of Dam Lake Therese County Morris State New Jersey Coordinators NJDEP

Date(s) Inspection 4/30/79 Weather Fair Temperature 75°F

Pool Elevation at Time of Inspection 364.3 M.S.L. Tailwater at Time of Inspection 340.0 M.S.L.

Inspection Personnel:

John Gribbin
David Hoyt
Ronald Lai
Joseph Fox
Richard McDermott

John Gribbin Recorder

Present: Liu Koncius
Manager of Schiff Reservation
Bud Hulbert
Staff member of Schiff Reservation

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
GENERAL	N.A.	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	N.A.	
DRAINS	N.A.	
WATER PASSAGES	N.A.	
FOUNDATION	N.A.	
VERTICAL AND HORIZONTAL ALIGNMENT	N.A.	

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	N.A.	
STRUCTURAL CRACKING	N.A.	
CONSTRUCTION JOINTS	N.A.	
MONOLITH JOINTS	N.A.	
LEAKAGE	N.A.	
SEEPAGE	N.A.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
GENERAL	The embankment is generally grass covered with a few bushes on the downstream face at either end. One small tree and one telephone pole are located on the dam crest.	
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Appeared to be in good condition.	
ANY NOTICEABLE SEEPAGE	None	One wet area observed at toe of dam appeared to be due to surface runoff.
STAFF GAGE AND RECORDER	None	
DRAINS	Rock drains within the dam could not be observed.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	None observed.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Vertical: level Horizontal: straight	
RIPRAP FAILURES	Riprap on the upstream face in good condition. Riprap in good condition was noted to a depth of approx. 2 feet below the lake surface.	

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SURFACES IN OUTLET CONDUIT	Concrete surfaces at sides of gates are slightly deteriorated resulting in slight leakage.	Outlet works consist of two steel radial gates. Two gated outlet pipes reportedly are not used.
INTAKE STRUCTURE	N.A.	
OUTLET STRUCTURE	Steel radial gates appear to be in satisfactory condition.	
OUTLET CHANNEL	Same as discharge channel for spillway.	
GATE AND GATE HOUSING	Steel radial gates appear to be in generally satisfactory condition. Rubber seals around edges are somewhat deteriorated resulting in slight leakage. Operating mechanisms appeared to be in good condition.	

SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
TIMBER WEIR	Weir appeared to be aligned straight and level. Weir appeared to be in satisfactory condition.	Weir was obscured by discharge.
APPROACH CHANNEL	N.A.	
DISCHARGE CHANNEL	Condition of training walls is generally satisfactory with some patching noted. Condition of bottom slabs is generally satisfactory with some erosion and spalling noted. Some exposed aggregate was observed.	Discharge channel consists of wide channe with rectangular section and concrete bottom constructed in steps. Sides consist of concrete training walls.
WALKWAY AND PIERS	Walkway appeared to be in good condition. Piers appeared to be in generally satisfactory condition with some deterioration at edges of gates.	A timber walkway spans the spillway and radial gates and is supported by spillway training walls and two concrete piers.

INSTRUMENTATION

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None observed.	
OBSERVATION WELLS	None	
WEIRS	None	
PIEZOMETERS	None	
OTHER	N.A.	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Average slope of lake shores is approx. 15%.	
SEDIMENTATION	Unknown	
STRUCTURES ALONG BANKS	A swimming area with docks and one building are located on the north shore of the lake. No other structures were observed.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Downstream channel is a well defined natural stream with generally wooded banks. No significant obstructions were observed.	
SLOPES	Average slope of banks is approx. 8%.	
STRUCTURES ALONG BANKS	One home is located adjacent to the stream 1800' from the dam. Two minor road bridges are located 1200' and 1800', respectively, from the dam.	

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
DAM - PLAN	Plans titled "Lake Therese Dam, Schiff Scout Reservation, Mendham, N.J." prepared by Sanderson & Porter, dated Oct. 27, 1932 (4 sheets).
SECTIONS	
SPILLWAY - PLAN	Sanderson & Porter plans
SECTIONS	
DETAILS	
OPERATING EQUIPMENT PLANS & DETAILS	Not available
OUTLETS - PLAN	Sanderson & Porter plans
DETAILS	
CONSTRAINTS	
DISCHARGE RATINGS	
HYDRAULIC/HYDROLOGIC DATA	Not available
RAINFALL/RESERVOIR RECORDS	Not available
CONSTRUCTION HISTORY	Not available
LOCATION MAP	Not available

ITEM	REMARKS
DESIGN REPORTS	Not available
GEOLOGY REPORTS	Not available
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	Not available
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	Not available
POST-CONSTRUCTION SURVEYS OF DAM	Not available
BORROW SOURCES	Not available

ITEM	REMARKS
MONITORING SYSTEMS	None
MODIFICATIONS	Not available
HIGH POOL RECORDS	Not available
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	Not available
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	Not available
MAINTENANCE OPERATION RECORDS	Not available

APPENDIX 2

Photographs

PHOTO 1

SPILLWAY

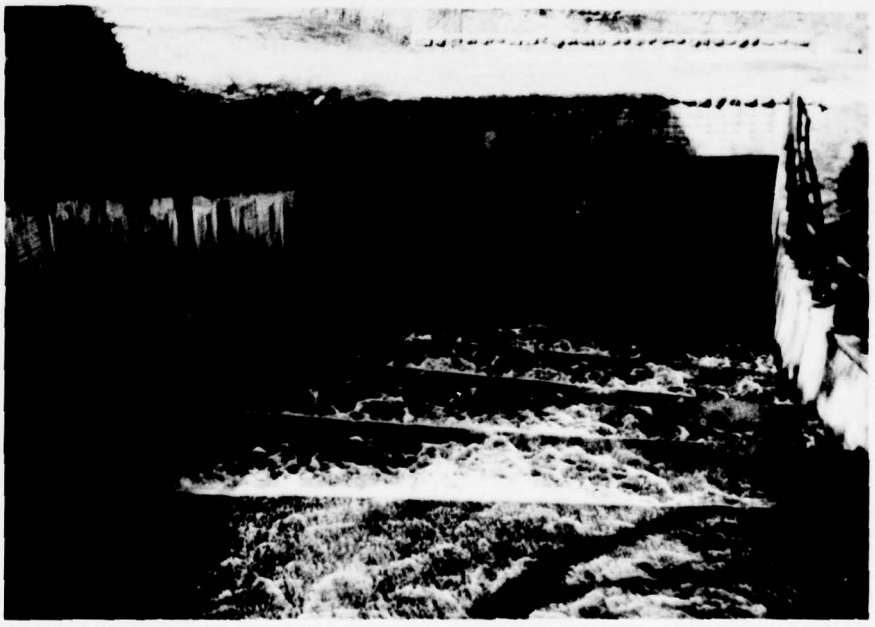


PHOTO 2

SPILLWAY DISCHARGE CHANNEL

LAKE THERESE DAM
30 APRIL 1979

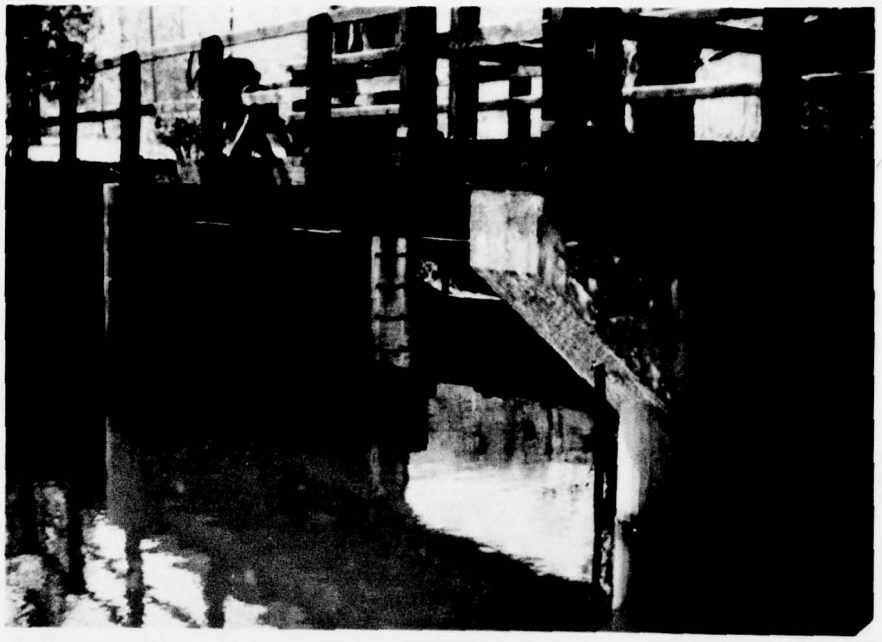


PHOTO 3

UPSTREAM VIEW OF SPILLWAY

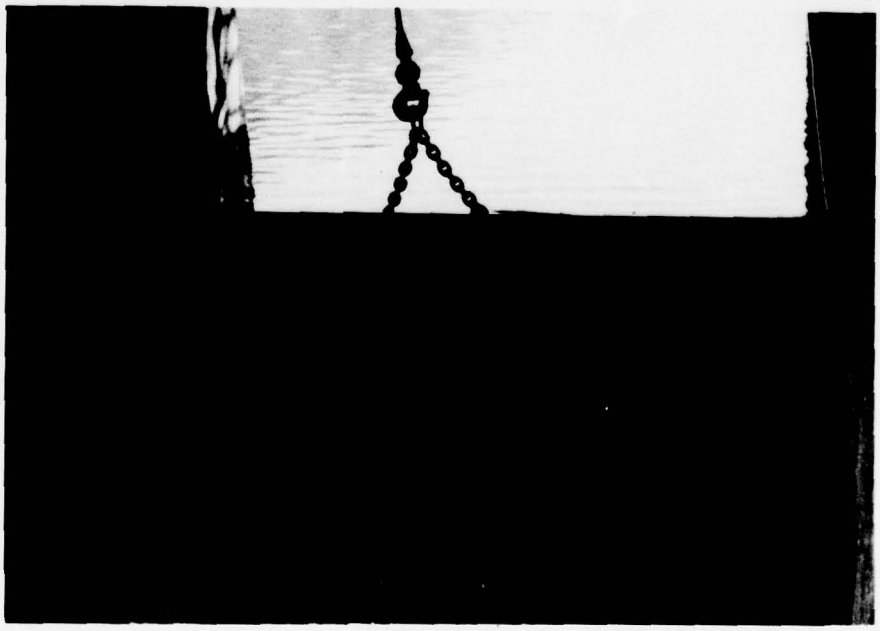


PHOTO 4

RADIAL GATE FOR OUTLET WORKS

LAKE THERESE DAM
30 APRIL 1979

PHOTO 5

CREST OF DAM

PHOTO 6

WALKWAY OVER SPILLWAY.
GATE OPERATING MECHANISM.

LAKE THERESE DAM
30 APRIL 1979

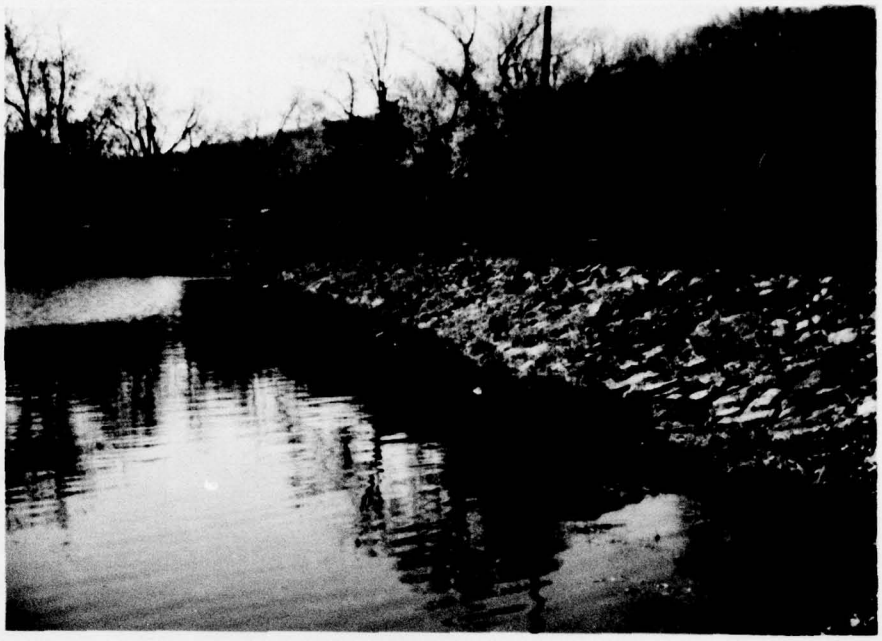


PHOTO 7

UPSTREAM FACE OF DAM

PHOTO 8

DOWNSTREAM FACE OF DAM

LAKE THERESE DAM
30 APRIL 1979

PHOTO 9

DOWNSTREAM CHANNEL

PHOTO 10

CHANNEL AND ROAD BRIDGE ADJACENT TO DWELLING
ONE-THIRD MILE DOWNSTREAM FROM DAM

LAKE THERESE DAM
30 APRIL 1979

APPENDIX 3

Engineering Data

CHECK LIST

HYDROLOGIC AND HYDRAULIC DATA

ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: Mostly Wooded

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 364.0 (125 acre-feet)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): N.A.

ELEVATION MAXIMUM DESIGN POOL: 369.0

ELEVATION TOP DAM: 369.0

SPILLWAY CREST: Conc. Ogee Shaped sill fitted with timber flahsboards and two steel radial gates.

a. Elevation 364.0

b. Type Straight sharp crested weir

c. Width N.A.

d. Length Flashboards-20'; Gates-2 @ 9.5' each

e. Location Spillover Along centerline of dam

f. Number and Type of Gates 2 steel radial (Tainter) gates

OUTLET WORKS: 2 Steel Radial (Tainter) Gates

a. Type Radial

b. Location North and south ends of spillway

c. Entrance inverts N.A.

d. Exit inverts North gate - 360.0; South gate 362.0

e. Emergency draindown facilities: Raise gates

HYDROMETEOROLOGICAL GAGES: None

a. Type N.A.

b. Location N.A.

c. Records N.A.

MAXIMUM NON-DAMAGING DISCHARGE:

(Lake stage equal to top of dam) 1334 c.f.s.

APPENDIX 4

Hydrologic Computations

Hydrology

100 yr flood by Report 38 Procedure

The 100 year flood flow will be calculated by using the following formula :

$$Q_{100} = 136\, A^{0.84}\, S^{0.26}\, S_t^{-0.51}\, I^{0.14}$$

Area of contributing drainage area(A) = 3.2 sq mi

Main channel slope (S)

Length from selected site to basin divide = 2.4 mi

85% of stream length = 2.0 mi

Elevation at 85% stream length = 540

10% of stream length = 0.24 mi

Elevation at 10% stream length = 390

Main channel slope $= \frac{540-390}{2.0-0.24} = 85$ ft/mi

Surface storage index (St) :

Area of lakes 27 AC = 0.04 sq mi

$$S_t = \left(\frac{0.04}{3.4}\right) 100 + 1$$

$$= 2.2\ \%$$

Man-made impervious cover index (I) = 1%

100 yr. flood

$$Q_{100} = 136\ (3.2)^{0.84}\ (85)^{0.26}\ (2.2)^{-0.51}\ (1)^{0.14}$$

$$= 136\ (2.66)\ (3.2)\ (0.669)\ (1)$$

$$= \underline{\underline{774}}\ \text{cfs}$$

STORCH ENGINEERS

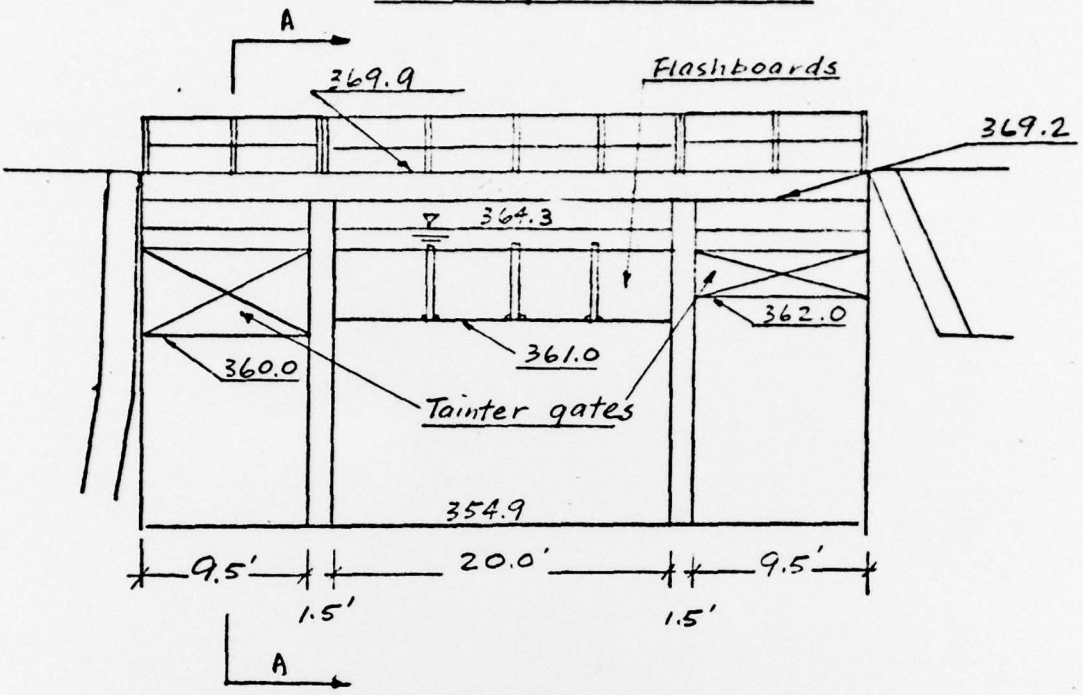
Sheet 3 of 9

Project Lake Therese Dam

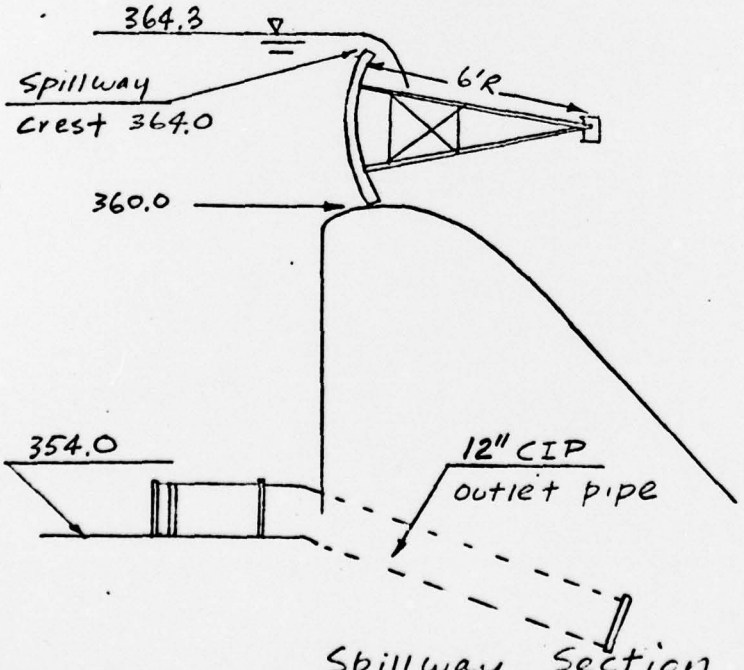
Made By RL Date 7-6-79

Chkd By JG Date 7-11-79

Spillway Hydraulics



Front Elevation



Spillway Section A A

Spillway Hydraulics

Discharge over spillway will be calculated by $Q = cLh^{3/2}$

Where $c = 3.3$

and $L = L' - 2(NKp + Ka)H$

Where L = effective length of crest

L' = net length of crest = 38.5'

N = number of piers = 2

Kp = pier contraction coef = 0.02

Ka = abutment contraction coef = 0.2

H = total head

Ref. Pg. 373 "Design of Small Dams"

$L = 38.5 - 2(2 \times 0.02 + 0.2)H$

$= 38.5 - 0.48H$

STORCH ENGINEERS

Sheet 5 of 9

Project Lake Therese Dam

Made By RL Date 6-29-79

Chkd By JG Date 7-11-79

STAGE DISCHARGE TABULATION

W.L.	H (ft)	C	L (ft)	$H^{3/2}$	Q (cfs)
364	0	3.3	-	-	0
365	1	3.3	38.0	1	125
366	2	3.3	37.5	2.8	347
367	3	3.3	37.0	5.2	635
368	4	3.3	36.6	8.0	966
369	5	3.3	36.1	11.2	1334 Top of dam
Orifice flow starts at 369.2					

STORCH ENGINEERS

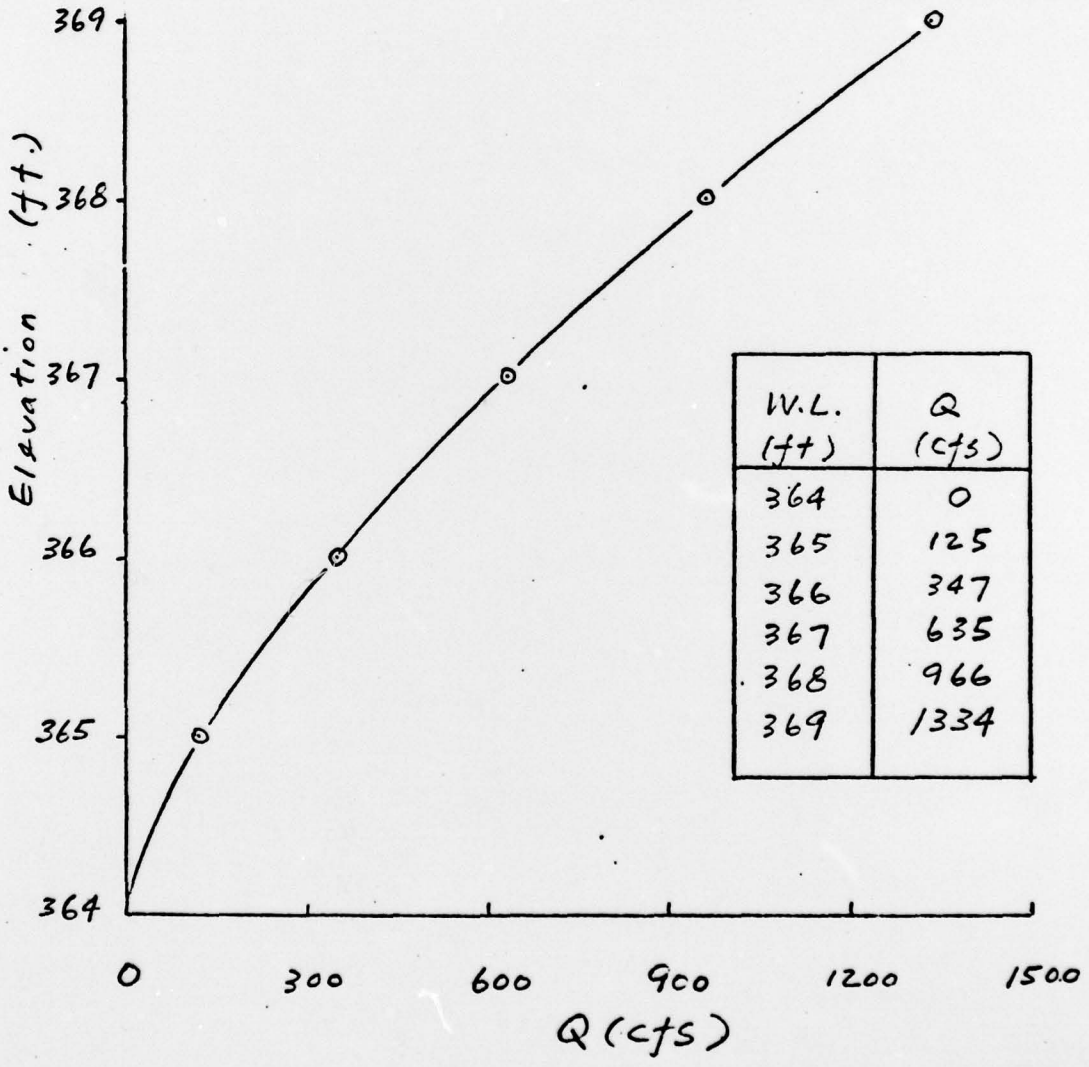
Sheet 6 of 9

Project Lake Therese Dam Made By RL Date 6-29-79

Chkd By JG Date 7-11-79

STAGE DISCHARGE CURVE

Top of dam at 369

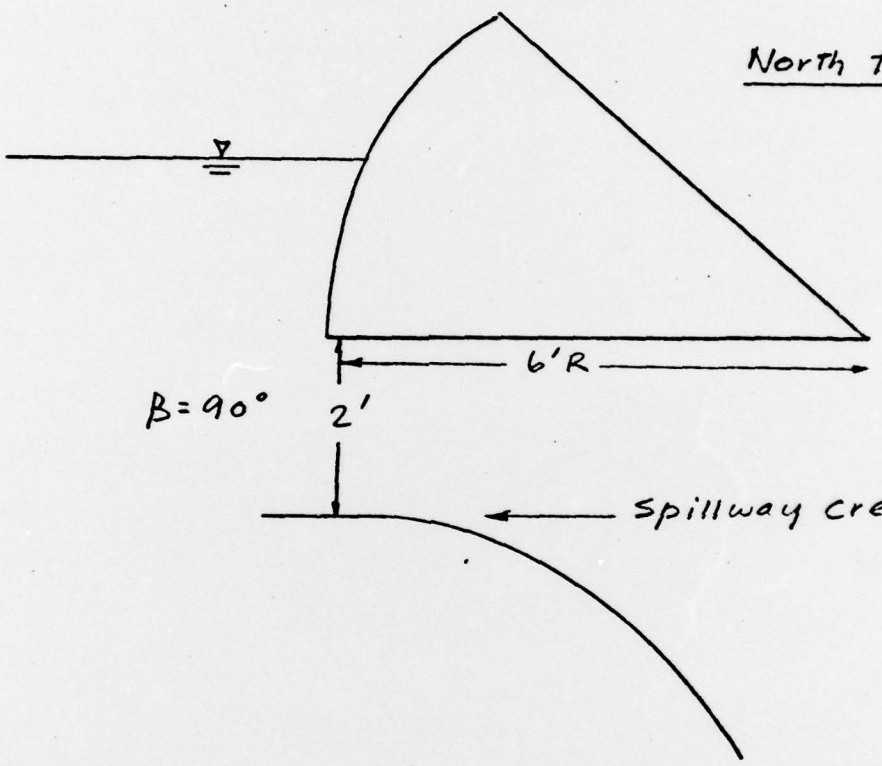


W.L. (ft)	Q (cfs)
364	0
365	125
366	347
367	635
368	966
369	1334

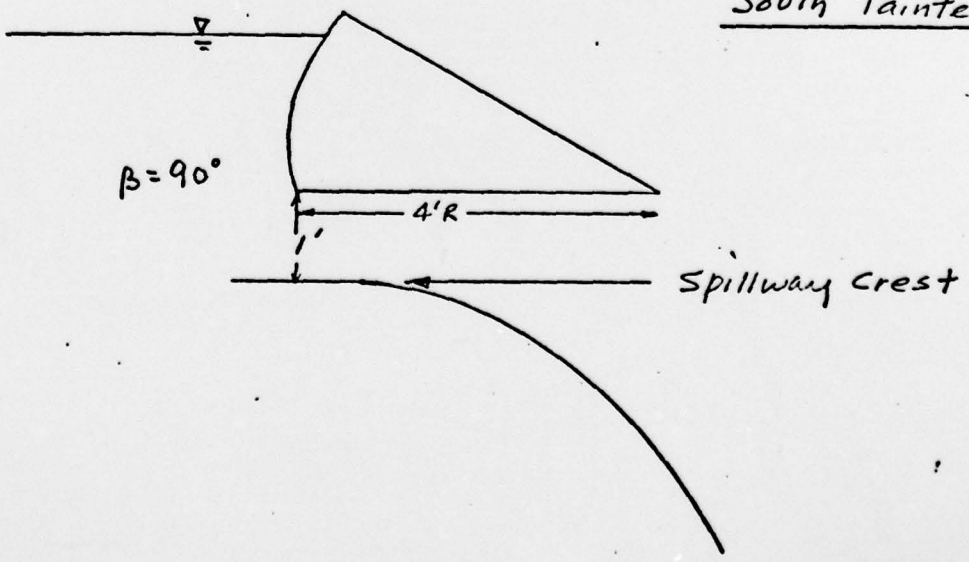
Outlet Works Capacity

Tainter Gates

North tainter gate



South tainter gate



Outlet Works Capacity

$Q = C G_o B \sqrt{2gH}$ (See next page)

G_o = Net gate openning
B = Gate width
H = Head to center of opening

C use 0.675 $X/Hd = 0$

For north gate

$G_o = 2'$ $B = 9.5$ $H = 3'$

$Q = 0.675(2)(9.5)\sqrt{(2g)3}$

$= 178$ cfs

For South gate

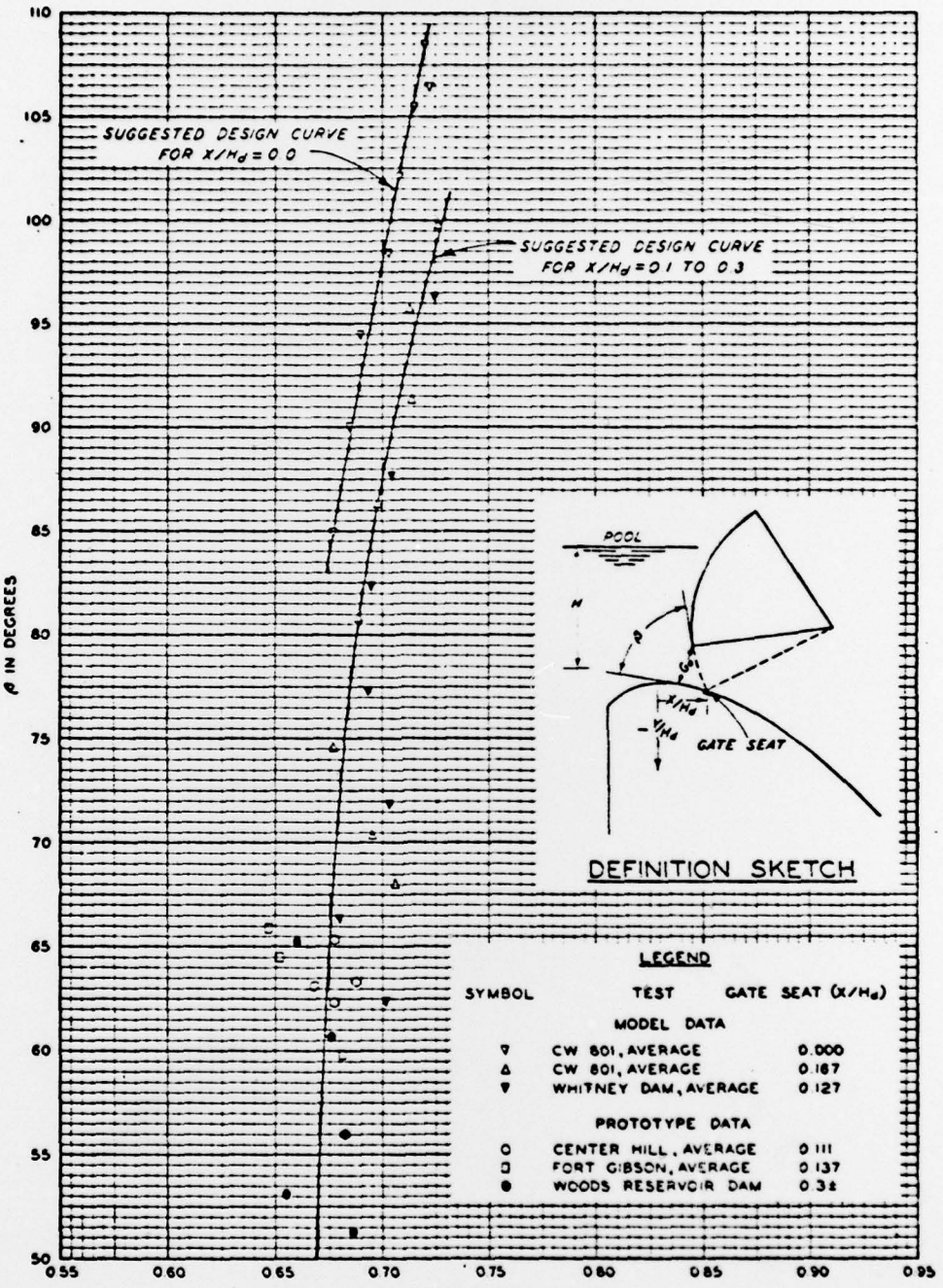
$Q = 0.675(1)(9.5)\sqrt{2g(3.5)}$

$= 96$ cfs

Total discharge at normal pool

$= 178 + 96$

$= \underline{\underline{274}}$ cfs



FORMULA

$$Q = CG_o B\sqrt{2gH}$$

WHERE:

G_o = NET GATE OPENING
B = GATE WIDTH
H = HEAD TO CENTER OF GATE OPENING

TAINTER GATES ON SPILLWAY CRESTS

DISCHARGE COEFFICIENTS

HYDRAULIC DESIGN CHART 311-1

WES 3-58

APPENDIX 5

Bibliography

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3. Holman, William W. and Jumikis, Alfreds R., Engineering Soil Survey of New Jersey, Report No. 9, Morris County, Rutgers University, New Brunswick, N.J. 1953.

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5. Stankowski, Stephen J., Magnitude and Frequency of Floods in New Jersey with Effects of Urbanization, Special Report 38, State of New Jersey Department of Environmental Protection, Division of Water Resources, 1974.

6. Safety of Small Dams, Proceedings of the Engineering Foundation Conference, American Society of Civil Engineers, 1974.

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8. Plans titled "Lake Therese Dam, Schiff Scout Reservation, Mendham, N.J., Boy Scouts of America," prepared by Sanderson & Porter, dated October 27, 1932.